

684.3210

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: )  
Hideki Matsumoto, et al. ) : Examiner: Not yet assigned  
Application No.: Not yet assigned ) : Group Art Unit: Not yet assigned  
Filed: April 5, 2001 ) :  
For: Developing Device, ) :  
Process Cartridge, ) :  
and Image Forming ) :  
Apparatus ) : April 5, 2001

Commissioner for Patents  
Washington, D.C. 20231

Preliminary Amendment

Sir:

Prior to examination, please amend the claims as follows:

In the Claims:

Please amend Claims 1, 3, 4, 6, 8-13, 17-20, 24, 25, 27, 29, 30-32, 34, 37-41, 43, 44, 46-48, 49, 50, 52-59, 61, 63-66, 69, 70, 74, 75, 77, 78, and 80-82 as follows. A marked-up copy of the claims, showing the changes made therein, is also attached. Note that all the claims currently pending in this application, including those not presently being amended, have been reproduced below for the Examiner's convenience.

1. (Amended) A developing device for developing an electrostatic latent image formed on an electrophotographic photosensitive member, said developing device being usable with a main assembly of an electrophotographic image forming apparatus, said developing device comprising:

a developing member for supplying a developer to the electrophotographic photosensitive member for developing the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode provided opposed to developing member;

a second electrode disposed such that at least a lower end thereof takes a position lower than said first electrode when said developing device is mounted to the main assembly of the electrophotographic image forming apparatus;

wherein an electric signal is generated in accordance with an electrostatic capacity between said first electrode and second electrode when said first electrode or second electrode is supplied with a voltage from the main assembly of said electrophotographic image forming apparatus, and is measured by the main assembly of the electrophotographic image forming apparatus to detect a remaining amount of the developer.

2. (Unamended) A device according to Claim 1, wherein said first electrode and said second electrode are disposed along a length of said developing member which is in the form of a developing roller.

3. (Amended) A device according to Claim 1 or 2, wherein said first electrode and a frame supporting said second electrode constitute a recess extending parallel to said developing device frame, said recess opens opening downward.

4. (Amended) A device according to Claim 1 or 2, wherein each of said first electrode and second electrode has a plate shape, wherein a length of said first electrode, measured in a direction crossing with a longitudinal direction of said developing member, is longer than said second electrode.

5. (Unamended) A device according to Claim 1 or 2, wherein one and the other of said first and second electrodes are plate-like and rod-like electrodes.

6. (Amended) A developing device for developing an electrostatic latent image formed on an electrophotographic photosensitive member, said developing device being usable with a main assembly of an electrophotographic image forming apparatus, said developing device comprising:

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode disposed opposed to said developing member; a second electrode disposed such that at least a lower end thereof takes a position lower than said first electrode when said developing device is mounted to the main assembly of the electrophotographic image forming apparatus;

a third electrode disposed between said second electrode and said developing member;  
a first electrical contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said first electrode when said developing device is mounted to the main assembly of said electrophotographic image forming apparatus;  
a second electrical contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said developing member when said developing device is mounted to the main assembly of said electrophotographic image forming apparatus;  
a third electrical contact for transmitting, to the main assembly of said electrophotographic image forming apparatus, an electric signal corresponding at least to electrostatic capacities between said first electrode and second electrode and between said developing member and said third electrode, when the voltages are applied to said first electrode and to said developing member, to detect a remaining amount of the developer by the main assembly of the electrophotographic image forming apparatus.

7. (Unamended) A device according to Claim 6, wherein said first electrode and said second electrode are disposed along a length of said developing member which is in the form of a developing roller.

8. (Amended) A device according to Claim 6 or 7, wherein said first electrode and a frame supporting said second electrode constitute a recess extending parallel to said developing member, and said recess opening downward.

9. (Amended) A device according to Claim 6 or 7, wherein said third electrode is a member which is integral with or separate from said second electrode, and is disposed opposed to said developing member.

10. (Amended) A device according to any one of Claims 6 and 7, further comprising a developer chamber having an opening in which said developing member is supported, and a developer container, connected with said developer chamber, for accommodating the developer, wherein said first, second and third electrodes are provided in said developer chamber.

11. (Amended) A device according to any one of Claims 1, 2, 6, and 7, further comprising developer stirring means for stirring the developer, wherein at least said first and second electrodes are disposed in a moving range of the developer provided by rotation of said developer stirring means.

12. (Amended) A developing device for developing an electrostatic latent image formed on an electrophotographic photosensitive member, said developing device being usable with a main assembly of an electrophotographic image forming apparatus, said developing device comprising:

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a developer accommodating portion for accommodating the developer to be used for development of the electrostatic latent image by said developing member;

a developer path electrode disposed along a path along which the developer accommodated in said developer accommodating portion moves to said developing member;

wherein an electric signal corresponding to an electrostatic capacity between said developing member and said developer path electrode is generated when a voltage is applied to said developing member from the main assembly of said electrophotographic image forming apparatus, to permit detection of a remaining amount of the developer by measuring the electric signal.

13. (Amended) A developing device for developing an electrostatic latent image formed on an electrophotographic photosensitive member, said developing device being usable with a main assembly of an electrophotographic image forming apparatus, said developing device comprising:

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode provided so as to exhibit the same potential as said developing member;

a second electrode disposed such that at least a lower end thereof takes a position lower than said first electrode when said developing device is mounted to the main assembly of the electrophotographic image forming apparatus;

a developer path electrode disposed along a path along which the developer accommodated in said developer accommodating portion moves to said developing member;

a first electrical contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said first electrode when said developing device is mounted to the main assembly of said electrophotographic image forming apparatus;

a second electric contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said developing member when said developing device is mounted to the main assembly of said electrophotographic image forming apparatus; and

a third electrical contact for transmitting, to the main assembly of the electrophotographic image forming apparatus, an electric signal corresponding to electrostatic capacities at least between said first electrode and said second electrode and between said developing member and said developer path electrode to detect a remaining amount of the developer by the main assembly of the electrophotographic image forming apparatus.

14. (Unamended) A device according to Claim 12 or 13, wherein said developer path electrode is in the form of a plate extending along the path.

15. (Unamended) A device according to Claim 13, further comprising a third electrode provided between said second electrode said second electrode and said developing member.

16. (Unamended) A device according to Claim 15, wherein said third electrode is a member which is integral with or separate from said second electrode, and is disposed opposed to said developing member.

17. (Amended) A device according to any one of Claims 13, 15, and 16, wherein said first electrode and said second electrode are arranged along a length of said developing member which is in the form of a developing roller.

18. (Amended) A device according to any one of Claims 13, 15, and 16, wherein said first electrode and a frame supporting said second electrode constitute a recess extending parallel to said developing member, and said recess opening downward.

19. (Amended) A device according to any one of Claims 13, 15, and 16, further comprising and intermediary electrode between said developing member and said developer path electrode.

20. (Amended) A device according to any one of Claims 15 and 16, further comprising developer stirring means for stirring the developer, wherein at least said first



electrode and second electrode are disposed in a moving range of the developer provided by rotation of said developer stirring means.

21. (Unamended) A device according to any one of Claims 1, 6 or 13, further comprising a stirring member for stirring the developer accommodated therein, wherein at least a lower end of said second electrode takes a position lower than said first electrode in a direction of movement of the developer provided by said stirring member, when said developing device is mounted to the main assembly of the electrophotographic image forming apparatus.

22. (Unamended) A process cartridge detachably mountable to a main assembly of an electrophotographic image forming apparatus, comprising:

(a) an electrophotographic photosensitive member;

(b) a developing device including;

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode disposed opposed to said developing member; and

a second electrode disposed such that at least a lower end thereof takes a position lower than said first electrode when said process cartridge is mounted to the main assembly of the electrophotographic image forming apparatus, wherein an electric signal is generated in accordance with an electrostatic capacity between said first electrode and second electrode when said first electrode or second electrode is supplied with a voltage from the

main assembly of said electrophotographic image forming apparatus, and is measured by the main assembly of the electrophotographic image forming apparatus to detect a remaining amount of the developer.

23. (Unamended) A process cartridge according to Claim 22, wherein said first electrode and said second electrode are disposed along a length of said developing member which is in the form of a developing roller.

24. (Amended) A process cartridge according to Claim 22 or 23, wherein said first electrode and a frame supporting said second electrode constitute a recess extending parallel to said developing device frame, said recess opening downward.

25. (Amended) A process cartridge according to Claim 22 or 23, wherein each of said first electrode and second electrode has a plate shape, wherein a length of said first electrode, measured in a direction crossing with a longitudinal direction of said developing member, is longer than said second electrode.

26. (Unamended) A process cartridge according to Claim 22 or 23, wherein one and the other of said first and second electrodes are plate-like and rod-like electrodes.

27. (Amended) A process cartridge detachably mountable to a main assembly of an electrophotographic image forming apparatus, comprising:

(a) an electrophotographic photosensitive member;

(b) a developing device including:

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode disposed opposed to said developing member;

a second electrode disposed such that at least a lower end thereof takes a position lower than said first electrode when said process cartridge is mounted to the main assembly of the electrophotographic image forming apparatus;

a third electrode disposed between said second electrode and said developing member;

a first electrical contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said first electrode when said process cartridge is mounted to the main assembly of said electrophotographic image forming apparatus;

a second electrical contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said developing member when said process cartridge is mounted to the main assembly of said electrophotographic image forming apparatus;

a third electrical contact for transmitting, to the main assembly of said electrophotographic image forming apparatus, an electric signal corresponding at least to electrostatic capacities between said first electrode and second electrode and between said developing member and said third electrode, when the voltages are applied to said first electrode and to said developing member, to detect a remaining amount of the developer by the main assembly of the electrophotographic image forming apparatus.

28. (Unamended) A process cartridge according to Claim 27, wherein said first electrode and said second electrode are disposed along a length of said developing member which is in the form of a developing roller.

29. (Amended) A process cartridge according to Claim 27 or 28, wherein said first electrode and a frame supporting said second electrode constitute a recess extending parallel to said developing device frame, said recess opening downward.

30. (Amended) A process cartridge according to Claim 27 or 28, wherein said third electrode is a member which is integral with or separate from said second electrode, and is disposed opposed to said developing member.

31. (Amended) A process cartridge according to any one of Claims 27 and 28, further comprising a developer chamber having an opening in which said developing member is supported, and a developer container, connected with said developer chamber, for accommodating the developer, wherein said first, second and third electrodes are provided in said developer chamber.

32. (Amended) A process cartridge according to any one of Claims 22, 23, 27, and 28, further comprising developer stirring means for stirring the developer, wherein at least said first and second electrodes are disposed in a moving range of the developer provided by rotation of said developer stirring means.

33. (Unamended) A process cartridge detachably mountable to a main assembly of an electrophotographic image forming apparatus, comprising:

- (a) an electrophotographic photosensitive member; and
- (b) a developing device including:
  - a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;
  - a developer accommodating portion for accommodating the developer to be used for development of the electrostatic latent image by said developing member; and
  - a developer path electrode disposed along a path along which the developer accommodated in said developer accommodating portion moves to said developing member;

wherein an electric signal corresponding to an electrostatic capacity between said developing member and said developer path electrode is generated when a voltage is applied to said developing member from the main assembly of said electrophotographic image forming apparatus, to permit detection of a remaining amount of the developer by measuring the electric signal.

34. (Amended) A process cartridge detachably mountable to a main assembly of an electrophotographic image forming apparatus, comprising:

- (a) an electrophotographic photosensitive member; and
- (b) a developing device including:

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode provided so as to exhibit the same potential as said developing member;

a second electrode disposed such that at least a lower end thereof takes a position lower than said first electrode when said developing device is mounted to the main assembly of the electrophotographic image forming apparatus;

a developer path electrode disposed along a path along which the developer accommodated in said developer accommodating portion moves to said developing member;

a first electrical contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said first electrode when said process cartridge is mounted to the main assembly of said electrophotographic image forming apparatus;

a second electric contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said developing member when said process cartridge is mounted to the main assembly of said electrophotographic image forming apparatus; and

a third electrical contact for transmitting, to the main assembly of the electrophotographic image forming apparatus, an electric signal corresponding to electrostatic capacities at least between said first electrode and said second electrode and between said developing member and said developer path electrode to detect a remaining

amount of the developer by the main assembly of the electrophotographic image forming apparatus.

35. (Unamended) A process cartridge according to Claim 33 or 34, wherein said developer path electrode is in the form of a plate extending along the path.

36. (Unamended) A process cartridge according to Claim 34, further comprising a third electrode provided between said second electrode said second electrode and said developing member.

37. (Amended) A process cartridge according to Claim 36, wherein said third electrode is a member which is integral with or separate from said second electrode, and is disposed opposed to said developing member .

38. (Amended) A process cartridge according to any one of Claims 33, 34, 36, and 37, wherein said first electrode and said second electrode are arranged along a length of said developing member which is in the form of a developing roller.

39. (Amended) A process cartridge according to any one of Claims 33, 34, 36, and 37, wherein said first electrode and a frame supporting said second electrode constitute a recess extending parallel to said developing member, and said recess opening downward.

40. (Amended) A process cartridge according to any one of Claims 33, 34, 36, and 37, further comprising an intermediary electrode between said developing member and said developer path electrode.

41. (Amended) A process cartridge according to any one of Claims 34, 36, and 37, further comprising developer stirring means for stirring the developer, wherein at least said first and second electrodes are disposed in a moving range of the developer provided by rotation of said developer stirring means.

42. (Unamended) A process cartridge according to any one of Claims 22, 27 or 34, further comprising further comprising a stirring member for stirring the developer accommodated therein, wherein at least a lower end of said second electrode takes a position lower than said first electrode in a direction of movement of the developer provided by said stirring member, when said developing device is mounted to the main assembly of the electrophotographic image forming apparatus.

43. (Amended) An electrophotographic image forming apparatus for forming an image on a recording material, comprising:

- (a) an electrophotographic photosensitive member;
- (b) an electrostatic latent image forming means for forming an electrostatic latent image on said electrophotographic photosensitive member; and
- (c) a developing device for developing an electrostatic latent image formed on said electrophotographic photosensitive member, said developing device including:



a developing member for supplying the developer to said electrophotographic photosensitive member;

a first electrode disposed opposed to said developing member; a second electrode disposed such that at least a lower end thereof takes a position lower than said first electrode when said developing device is mounted to a main assembly of the electrophotographic image forming apparatus;

wherein an electric signal is generated in accordance with an electrostatic capacity between said first electrode and second electrode when said first electrode or second electrode is supplied with a voltage from the main assembly of said electrophotographic image forming apparatus, and is measured by the main assembly of the electrophotographic image forming apparatus to detect a remaining amount of the developer.

44. (Amended) An electrophotographic image forming apparatus for forming an image on a recording material, wherein a process cartridge is detachably mountable to said electrophotographic image forming apparatus, said electrophotographic image forming apparatus comprising:

(a) an electrophotographic photosensitive member;

(b) mounting means for mounting the process cartridge, said process cartridge including:

a developing member for supplying a developer to said electrophotographic photosensitive member to develop an electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode disposed opposed to said developing member; and

a second electrode disposed such that at least a lower end thereof takes a position lower than said first electrode when said developing device is mounted to the main assembly of the electrophotographic image forming apparatus;

(c) electrostatic latent image forming means for forming the electrostatic latent image on said electrophotographic photosensitive member; and

(d) developer remaining amount detecting means for detecting a remaining amount of the developer by measuring an electric signal which is produced by application of a voltage to said first electrode or second electrode and which corresponds to an electrostatic capacity between said first electrode and second electrode.

45. (Unamended) An apparatus according to Claim 43 or 44, wherein said first electrode and said second electrode are disposed along a length of said developing member which is in the form of a developing roller.

46. (Amended) A apparatus according to Claim 43 or 44, wherein said first electrode and a frame supporting said second electrode constitute a recess extending parallel to said developing device frame, said recess opening downward.

47. (Amended) An apparatus according to any one of Claims 43 and 44, wherein each of said first electrode and second electrode has a plate shape, wherein a length of said first electrode, measured in a direction crossing with a longitudinal direction of said developing member, is longer than said second electrode.

48. (Amended) An apparatus according to Claim 43 or 44, wherein one and the other of said first and second electrodes are plate-like and rod-like electrodes.

49. (Amended) An electrophotographic image forming apparatus for forming an image on a recording material, comprising

(a) an electrophotographic photosensitive member;

(b) an electrostatic latent image forming means for forming an electrostatic latent image on said electrophotographic photosensitive member;

(c) a developing device for developing the electrostatic latent image formed on said electrophotographic photosensitive member, said developing device including:

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode disposed opposed to said developing member;

a second electrode disposed such that at least a lower end thereof takes a position lower than said first electrode when said developing device is mounted to the main assembly of the electrophotographic image forming apparatus;

a third electrode disposed between said second electrode and said developing member;

a first electrical contact for receiving, from the main assembly of said electrophotographic

image forming apparatus, a voltage to be applied to said first electrode when said developing device is mounted to the main assembly of said electrophotographic image forming apparatus;

a second electrical contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said developing member when said developing device is mounted to the main assembly of said electrophotographic image forming apparatus;

a third electrical contact for transmitting, to the main assembly of said electrophotographic image forming apparatus, an electric signal corresponding at least to electrostatic capacities between said first electrode and second electrode and between said developing member and said third electrode, when the voltages are applied to said first electrode and to said developing member; and

(d) developer amount detecting means for detecting an amount of the developer in said developing device on the basis of the electric signal transmitted from said third electric contact.

50. (Amended) An electrophotographic image forming apparatus for forming an image on a recording material, wherein a process cartridge is detachably mountable to a main assembly of said electrophotographic image forming apparatus, said electrophotographic image forming apparatus comprising:

(a) an electrophotographic photosensitive member;

(b) mounting means for detachably mounting the process cartridge, the process cartridge including:

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode disposed opposed to said developing member;

a second electrode disposed such that at least a lower end thereof takes a position lower than said first electrode when said developing device is mounted to the main assembly of the electrophotographic image forming apparatus;

a third electrode disposed between said second electrode and said developing member;

a first electrical contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said first electrode when said developing device is mounted to the main assembly of said electrophotographic image forming apparatus;

a second electrical contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said developing member when said developing device is mounted to the main assembly of said electrophotographic image forming apparatus; and

a third electrical contact for transmitting, to the main assembly of said electrophotographic image forming apparatus, an electric signal corresponding at least to electrostatic capacities between said first electrode and second electrode and between said developing member and said third electrode, when the voltages are applied to said first electrode and to said developing member, to detect a remaining amount of the developer by the main assembly of the electrophotographic image forming apparatus;

(c) electrostatic latent image forming means for forming the electrostatic latent image on said electrophotographic photosensitive member; and

(d) developer amount detecting means for detecting an amount of the developer in said developing device on the basis of the electric signal transmitted from said third electric contact.

51. (Unamended) An apparatus according to Claim 49 or 50, wherein said first electrode and said second electrode are disposed along a length of said developing member which is in the form of a developing roller.

52. (Amended) An apparatus according to Claim 49 or 50, wherein said first electrode and a frame supporting said second electrode constitute a recess extending parallel to said developing member, and said recess opening downward.

53. (Amended) An apparatus according to Claim 49 or 50, wherein said third electrode is a member which is integral with or separate from said second electrode, and is disposed opposed to said developing member.

54. (Amended) An apparatus according to any one of Claims 49 and 50, further comprising a developer chamber having an opening in which said developing member is supported, and a developer container, connected with said developer chamber, for accommodating the developer, wherein said first, second and third electrodes are provided in said developer chamber.

55. (Amended) An apparatus according to any one of Claims 43, 44, 49, and 50, further comprising developer stirring means for stirring the developer, wherein at least said first and second electrodes are disposed in a moving range of the developer provided by rotation of said developer stirring means.

56. (Amended) An electrophotographic image forming apparatus for forming an image on a recording material, comprising

(a) an electrophotographic photosensitive member,

(b) an electrostatic latent image forming means for forming an electrostatic latent image on said electrophotographic photosensitive member;

(c) a developing device for developing the electrostatic latent image formed on said electrophotographic photosensitive member, said developing device including:

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a developer accommodating portion for accommodating the developer to be used for development of the electrostatic latent image by said developing member; and

a developer path electrode disposed along a path along which the developer accommodated in said developer accommodating portion moves to said developing member;

wherein an electric signal corresponding to an electrostatic capacity between said developing member and said developer path electrode is generated when a voltage is applied to said developing member from the main assembly of said electrophotographic

image forming apparatus, to permit detection of a remaining amount of the developer by measuring the electric signal.

57. (Amended) An electrophotographic image forming apparatus for forming an image on a recording material, comprising:

(a) an electrophotographic photosensitive member:

(b) an electrostatic latent image forming means for forming an electrostatic latent image on said electrophotographic photosensitive member;

(c) a developing device for developing the electrostatic latent image formed on said electrophotographic photosensitive member, said developing device including;

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode provided so as to exhibit the same potential as said developing member;

a second electrode disposed such that at least a lower end thereof takes a position lower than said first electrode when said developing device is mounted to the main assembly of the electrophotographic image forming apparatus;

a developer path electrode disposed along a path along which the developer accommodated in said developer accommodating portion moves to said developing member;

a first electrical contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said first electrode



when said developing device is mounted to the main assembly of said electrophotographic image forming apparatus;

a second electric contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said developing member when said developing device is mounted to the main assembly of said electrophotographic image forming apparatus; and

a third electrical contact for transmitting, to the main assembly of the electrophotographic image forming apparatus, an electric signal corresponding to electrostatic capacities at least between said first electrode and said second electrode and between said developing member and said developer path electrode to detect a remaining amount of the developer by the main assembly of the electrophotographic image forming apparatus.

58. (Amended) An electrophotographic image forming apparatus for forming an image on a recording material, wherein a process cartridge is detachably mountable to a main assembly of said electrophotographic image forming apparatus, said electrophotographic image forming apparatus comprising:

(a) an electrophotographic photosensitive member;

(b) mounting means for detachably mounting the process cartridge, the process cartridge including:

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a developer accommodating portion for accommodating the developer to be used for development of the electrostatic latent image by said developing member; and

a developer path electrode disposed along a path along which the developer accommodated in said developer accommodating portion moves to said developing member;

wherein an electric signal corresponding to an electrostatic capacity between said developing member and said developer path electrode is generated when a voltage is applied to said developing member from the main assembly of said electrophotographic image forming apparatus, to permit detection of a remaining amount of the developer by measuring the electric signal.

59. (Amended) An electrophotographic image forming apparatus for forming an image on a recording material, wherein a process cartridge is detachably mountable to a main assembly of said electrophotographic image forming apparatus, said electrophotographic image forming apparatus comprising:

(a) an electrophotographic photosensitive member;

(b) mounting means for detachably mounting the process cartridge, the process cartridge including:

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode provided so as to exhibit the same potential as said developing member;

a second electrode disposed such that at least a lower end thereof takes a position lower than said first electrode when said developing device is mounted to the main assembly of the electrophotographic image forming apparatus;

a developer path electrode disposed along a path along which the developer accommodated in said developer accommodating portion moves to said developing member;

a first electrical contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said first electrode when said developing device is mounted to the main assembly of said electrophotographic image forming apparatus;

a second electric contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said developing member when said developing device is mounted to the main assembly of said electrophotographic image forming apparatus; and

a third electrical contact for transmitting, to the main assembly of the electrophotographic image forming apparatus, an electric signal corresponding to electrostatic capacities at least between said first electrode and said second electrode and between said developing member and said developer path electrode to detect a remaining amount of the developer by the main assembly of the electrophotographic image forming apparatus;

(b) electrostatic latent image forming means for forming the electrostatic latent image on said electrophotographic photosensitive member; and

(c) developer amount detecting means for detecting an amount of the developer in said developing device on the basis of the electric signal transmitted from said third electric contact.

60. (Unamended) An apparatus according to any one of Claims 56-59, wherein said developer path electrode is in the form of a plate extending along the path.

61. (Amended) An apparatus according to any one of Claims 56-59, further comprising a third electrode provided between said second electrode said second electrode and said developing member.

62. (Unamended) An apparatus according to according to Claim 61, wherein said third electrode is a member which is integral with or separate from said second electrode, and is disposed opposed to said developing member.

63. (Amended) An apparatus according to any one of Claims 56-59, wherein said first electrode and said second electrode are arranged along a length of said developing member which is in the form of a developing roller.

64. (Amended) An apparatus according to any one of Claims 56-59, wherein said first electrode and a frame supporting said second electrode constitute a recess extending parallel to said developing member, and said recess opening downward.

65. (Amended) An apparatus according to any one of Claims 56-59, further comprising an intermediary electrode between said developing member and said developer path electrode.

66. (Amended) An apparatus according to any one of Claims 56-59, further comprising developer stirring means for stirring the developer, wherein at least said first electrode and second electrode are disposed in a moving range of the developer provided by rotation of said developer stirring means.

67. (Unamended) A developing device for developing an electrostatic latent image formed on an electrophotographic photosensitive member, said developing device being usable with an electrophotographic image forming apparatus, said developing device comprising:

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode disposed opposed to said developing member;

a stirring member for stirring the developer accommodated;

a second electrode which is disposed at a position different from that of said first electrode in a direction crossing with a moving direction of the developer provided by said stirring member;

wherein an electric signal is generated in accordance with an electrostatic capacity between said first electrode and second electrode when said first electrode or second

electrode is supplied with a voltage from the main assembly of said electrophotographic image forming apparatus, and is measured by the main assembly of the electrophotographic image forming apparatus to detect a remaining amount of the developer.

68. (Unamended) A device according to Claim 67, wherein said first electrode and said second electrode are disposed along a length of said developing member which is in the form of a developing roller.

69. (Amended) A device according to Claim 67 or 68, wherein said first electrode and a frame supporting said second electrode constitute a recess extending parallel to said developing device frame, said recess opening downward.

70. (Amended) A device according to Claim 67 or 68, wherein each of said first electrode and second electrode has a plate shape, wherein a length of said first electrode, measured in a direction crossing with a longitudinal direction of said developing member, is longer than said second electrode.

71. (Unamended) A device according to Claim 67 or 68, wherein one and the other of said first and second electrodes are plate-like and rod-like electrodes.

72. (Unamended) A process cartridge detachably mountable to a main assembly of an electrophotographic image forming apparatus, comprising:

(a) an electrophotographic photosensitive member; and

(b) a developing device including:

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode disposed opposed to said developing member;

a stirring member for stirring the developer accommodated;

a second electrode which is disposed at a position different from that of said first electrode in a direction crossing with a moving direction of the developer provided by said stirring member;

wherein an electric signal is generated in accordance with an electrostatic capacity between said first electrode and second electrode when said first electrode or second electrode is supplied with a voltage from the main assembly of said electrophotographic image forming apparatus, and is measured by the main assembly of the electrophotographic image forming apparatus to detect a remaining amount of the developer.

73. (Unamended) A process cartridge according to Claim 72, wherein said first electrode and said second electrode are disposed along a length of said developing member which is in the form of a developing roller.

74. (Amended) A process cartridge according to Claim 72 or 73, wherein said first electrode and a frame supporting said second electrode constitute a recess extending parallel to said developing device frame, said recess opening downward.

75. (Amended) A process cartridge according to Claim 72 or 73, wherein each of said first electrode and second electrode has a plate shape, wherein a length of said first electrode, measured in a direction crossing with a longitudinal direction of said developing member, is longer than said second electrode.

76. (Unamended) A process cartridge according to Claim 72 or 73, wherein one and the other of said first and second electrodes are plate-like and rod-like electrodes.

77. (Amended) An electrophotographic image forming apparatus for forming an image on a recording material, comprising:

(a) an electrophotographic photosensitive member:

(b) an electrostatic latent image forming means for forming an electrostatic latent image on said electrophotographic photosensitive member;

(c) a developing device for developing the electrostatic latent image formed on said electrophotographic photosensitive member, said developing device including:

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode disposed opposed to said developing member;



a stirring member for stirring the developer accommodated;

a second electrode which is disposed at a position different from that of said first electrode in a direction crossing with a moving direction of the developer provided by said stirring member;

wherein an electric signal is generated in accordance with an electrostatic capacity between said first electrode and second electrode when said first electrode or second electrode is supplied with a voltage from the main assembly of said electrophotographic image forming apparatus, and is measured by the main assembly of the electrophotographic image forming apparatus to detect a remaining amount of the developer.

78. (Amended) An electrophotographic image forming apparatus for forming an image on a recording material, wherein a process cartridge is detachably mountable to a main assembly of said electrophotographic image forming apparatus, said electrophotographic image forming apparatus comprising:

(a) an electrophotographic photosensitive member;

(b) mounting means for detachably mounting the process cartridge, the process cartridge including:

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode disposed opposed to said developing member;

a stirring member for stirring the developer accommodated;

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a second electrode which is disposed at a position different from that of said first electrode in a direction crossing with a moving direction of the developer provided by said stirring member;

(c) electrostatic latent image forming means for forming the electrostatic latent image on said electrophotographic photosensitive member; and

(d) developer amount detecting means for detecting an amount of the developer in said developing device on the basis of the electric signal transmitted from said third electric contact.

79. (Unamended) An apparatus according to Claim 77 or 78, wherein said first electrode and said second electrode are disposed along a length of said developing member which is in the form of a developing roller.

80. (Amended) An apparatus according to Claim 77 or 78, wherein said first electrode and a frame supporting said second electrode constitute a recess extending parallel to said developing device frame, said recess opening downward.

81. (Amended) An apparatus according to Claim 77 and 78, wherein each of said first electrode and second electrode has a plate shape, wherein a length of said first electrode, measured in a direction crossing with a longitudinal direction of said developing member, is longer than said second electrode.

82. (Amended) An apparatus according to Claim 77 or 78, wherein one and the other of said first and second electrodes are plate-like and rod-like electrodes.

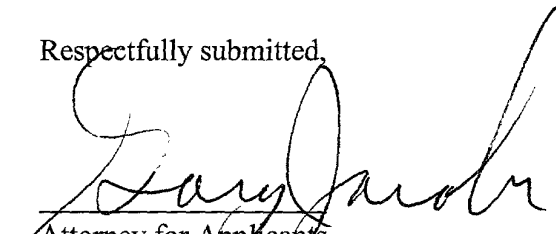
Remarks

Claims 1, 3, 4, 6, 8-13, 17-20, 24, 25, 27, 29, 30-32, 34, 37-41, 43, 44, 46-48, 49, 50, 52-59, 61, 63-66, 69, 70, 74, 75, 77, 78, and 80-82 have been amended to remove improper multiple dependencies and to correct other minor informalities therein.

Consideration and an early allowance are respectfully solicited.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,



Attorney for Applicants  
Registration No. 28,861

FITZPATRICK, CELLA, HARPER & SCINTO  
30 Rockefeller Plaza  
New York, New York 10112-3801  
Facsimile No.: (212) 218-2200

Marked-up Version of Amended Claims

1. (Amended) A developing device for developing an electrostatic latent image formed on an electrophotographic photosensitive member, said developing device being usable with a main assembly of an electrophotographic image forming apparatus, said developing device comprising[.];

a developing member for supplying a developer to the electrophotographic photosensitive member for developing the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode provided opposed to developing member;

a second electrode disposed such that at least a lower end thereof takes a position lower than said first electrode when said developing device is mounted to the main assembly of the electrophotographic image forming apparatus;

wherein an electric signal is generated in accordance with an electrostatic capacity between said first electrode and second electrode when said first electrode or second electrode is supplied with a voltage from the main assembly of said electrophotographic image forming apparatus, and is measured by the main assembly of the electrophotographic image forming apparatus to detect a remaining amount of the developer.

2. (Unamended) A device according to Claim 1, wherein said first electrode and said second electrode are disposed along a length of said developing member which is in the form of a developing roller.

3. (Amended) A device according to Claim 1 or 2, wherein said first electrode and a frame supporting said second electrode constitute a recess extending parallel to said developing device frame, said recess [opens] opening downward.

4. (Amended) A device according to Claim 1 or [,] 2 [or 3], wherein each of said first electrode and second electrode has a plate shape, wherein a length of said first electrode, measured in a direction crossing with a longitudinal direction of said developing member, is longer than said second electrode.

5. (Unamended) A device according to Claim 1 or 2, wherein one and the other of said first and second electrodes are plate-like and rod-like electrodes.

6. (Amended) A developing device for developing an electrostatic latent image formed on an electrophotographic photosensitive member, said developing device being usable with a main assembly of an electrophotographic image forming apparatus, said developing device comprising[;]:

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode disposed opposed to said developing member; a second electrode disposed such that at least a lower end thereof takes a position lower than said first electrode when said developing device is mounted to the main assembly of the electrophotographic image forming apparatus;

a third electrode disposed between said second electrode and said developing member;

a first electrical contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said first electrode when said developing device is mounted to the main assembly of said electrophotographic image forming apparatus;

a second electrical contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said developing member when said developing device is mounted to the main assembly of said electrophotographic image forming apparatus;

a third electrical contact for transmitting, to the main assembly of said electrophotographic image forming apparatus, an electric signal corresponding at least to electrostatic capacities between said first electrode and second electrode and between said developing member and said third electrode, when the voltages are applied to said first electrode and to said developing member, to detect a remaining amount of the developer by the main assembly of the electrophotographic image forming apparatus.

7. (Unamended) A device according to Claim 6, wherein said first electrode and said second electrode are disposed along a length of said developing member which is in the form of a developing roller.

8. (Amended) A device according to Claim 6 or 7, wherein said first electrode and a frame supporting said second electrode constitute a recess extending parallel to said developing member, and said recess [opens] opening downward.

9. (Amended) A device according to Claim 6 [,] or 7 [or 8], wherein said third electrode is a member which is integral with or separate from said second electrode, and is disposed opposed to said developing member.

10. (Amended) A device according to any one of Claims [6-9] 6 and 7, further comprising a developer chamber having an opening in which said developing member is supported, and a developer container, connected with said developer chamber, for accommodating the developer, wherein said first, second and third electrodes are provided in said developer chamber.

11. (Amended) A device according to any one of Claims [1-10] 1, 2, 6, and 7, further comprising developer stirring means for stirring the developer, wherein at least said first and second electrodes are disposed in a moving range of the developer provided by rotation of said developer stirring means.

12. (Amended) A developing device for developing an electrostatic latent image formed on an electrophotographic photosensitive member, said developing device being usable with a main assembly of an electrophotographic image forming apparatus, said developing device comprising[;]:

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a developer accommodating portion for accommodating the developer to be used for development of the electrostatic latent image by said developing member;

a developer path electrode disposed along a path along which the developer accommodated in said developer accommodating portion moves to said developing member;

wherein an electric signal corresponding to an electrostatic capacity between said developing member and said developer path electrode is generated when a voltage is applied to said developing member from the main assembly of said electrophotographic image forming apparatus, to permit detection of a remaining amount of the developer by measuring the electric signal.

13. (Amended) A developing device for developing an electrostatic latent image formed on an electrophotographic photosensitive member, said developing device being usable with a main assembly of an electrophotographic image forming apparatus, said developing device comprising[;]:

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode provided so as to exhibit the same [or] potential as said developing member;



a second electrode disposed such that at least a lower end thereof takes a position lower than said first electrode when said developing device is mounted to the main assembly of the electrophotographic image forming apparatus;

a developer path electrode disposed along a path along which the developer accommodated in said developer accommodating portion moves to said developing member;

a first electrical contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said first electrode when said developing device is mounted to the main assembly of said electrophotographic image forming apparatus;

a second electric contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said developing member when said developing device is mounted to the main assembly of said electrophotographic image forming apparatus; and

a third electrical contact for transmitting, to the main assembly of the electrophotographic image forming apparatus, an electric signal corresponding to electrostatic capacities at least between said first electrode and said second electrode and between said developing member and said developer path electrode to detect a remaining amount of the developer by the main assembly of the electrophotographic image forming apparatus.

14. (Unamended) A device according to Claim 12 or 13, wherein said developer path electrode is in the form of a plate extending along the path.

15. (Unamended) A device according to Claim 13, further comprising a third electrode provided between said second electrode said second electrode and said developing member.

16. (Unamended) A device according to Claim 15, wherein said third electrode is a member which is integral with or separate from said second electrode, and is disposed opposed to said developing member.

17. (Amended) A device according to any one of Claims [13-16] 13, 15, and 16, wherein said first electrode and said second electrode are arranged along a length of said developing member which is in the form of a developing roller.

18. (Amended) A device according to any one of Claims [13-17] 13, 15, and 16, wherein said first electrode and a frame supporting said second electrode constitute a recess extending parallel to said developing member, and said recess [opens] opening downward.

19. (Amended) A device according to any one of Claims [13-18] 13, 15, and 16, further comprising and intermediary electrode between said developing member and said developer path electrode.

20. (Amended) A device according to any one of Claims [14-19] 15 and 16, further comprising developer stirring means for stirring the developer, wherein at least said first

electrode and second electrode are disposed in a moving range of the developer provided by rotation of said developer stirring means.

21. (Unamended) A device according to any one of Claims 1, 6 or 13, further comprising a stirring member for stirring the developer accommodated therein, wherein at least a lower end of said second electrode takes a position lower than said first electrode in a direction of movement of the developer provided by said stirring member, when said developing device is mounted to the main assembly of the electrophotographic image forming apparatus.

22. (Unamended) A process cartridge detachably mountable to a main assembly of an electrophotographic image forming apparatus, comprising:

(a) an electrophotographic photosensitive member;

(b) a developing device including;

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode disposed opposed to said developing member; and

a second electrode disposed such that at least a lower end thereof takes a position lower than said first electrode when said process cartridge is mounted to the main assembly of the electrophotographic image forming apparatus, wherein an electric signal is generated in accordance with an electrostatic capacity between said first electrode and second electrode when said first electrode or second electrode is supplied with a voltage from the

main assembly of said electrophotographic image forming apparatus, and is measured by the main assembly of the electrophotographic image forming apparatus to detect a remaining amount of the developer.

23. (Unamended) A process cartridge according to Claim 22, wherein said first electrode and said second electrode are disposed along a length of said developing member which is in the form of a developing roller.

24. (Amended) A process cartridge according to Claim 22 or 23, wherein said first electrode and a frame supporting said second electrode constitute a recess extending parallel to said developing device frame, said recess [opens] opening downward.

25. (Amended) A process cartridge according to Claim 22[, or 23 [or 24], wherein each of said first electrode and second electrode has a plate shape, wherein a length of said first electrode, measured in a direction crossing with a longitudinal direction of said developing member, is longer than said second electrode.

26. (Unamended) A process cartridge according to Claim 22 or 23, wherein one and the other of said first and second electrodes are plate-like and rod-like electrodes.

27. (Amended) A process cartridge detachably mountable to a main assembly of an electrophotographic image forming apparatus, comprising:

(a) an electrophotographic photosensitive member;

(b) a developing device including[,:];

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode disposed opposed to said developing member;

a second electrode disposed such that at least a lower end thereof takes a position lower than said first electrode when said process cartridge is mounted to the main assembly of the electrophotographic image forming apparatus;

a third electrode disposed between said second electrode and said developing member;

a first electrical contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said first electrode when said process cartridge is mounted to the main assembly of said electrophotographic image forming apparatus;

a second electrical contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said developing member when said process cartridge is mounted to the main assembly of said electrophotographic image forming apparatus;

a third electrical contact for transmitting, to the main assembly of said electrophotographic image forming apparatus, an electric signal corresponding at least to electrostatic capacities between said first electrode and second electrode and between said developing member and said third electrode, when the voltages are applied to said first electrode and to said developing member, to detect a remaining amount of the developer by the main assembly of the electrophotographic image forming apparatus.

28. (Unamended) A process cartridge according to Claim 27, wherein said first electrode and said second electrode are disposed along a length of said developing member which is in the form of a developing roller.

29. (Amended) A process cartridge according to Claim 27 or 28, wherein said first electrode and a frame supporting said second electrode constitute a recess extending parallel to said developing device frame, said recess [opens] opening downward.

30. (Amended) A process cartridge according to Claim 27[,] or 28 [or 29], wherein said third electrode is a member which is integral with or separate from said second electrode, and is disposed opposed to said developing member.

31. (Amended) A process cartridge according to any one of Claims [27-30] 27 and 28, further comprising a developer chamber having an opening in which said developing member is supported, and a developer container, connected with said developer chamber, for accommodating the developer, wherein said first, second and third electrodes are provided in said developer chamber.

32. (Amended) A process cartridge according to any one of Claims [22-31] 22, 23, 27, and 28, further comprising developer stirring means for stirring the developer, wherein at least said first and second electrodes are disposed in a moving range of the developer provided by rotation of said developer stirring means.

33. (Unamended) A process cartridge detachably mountable to a main assembly of an electrophotographic image forming apparatus, comprising:

- (a) an electrophotographic photosensitive member; and
- (b) a developing device including:
  - a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;
  - a developer accommodating portion for accommodating the developer to be used for development of the electrostatic latent image by said developing member; and
  - a developer path electrode disposed along a path along which the developer accommodated in said developer accommodating portion moves to said developing member;

wherein an electric signal corresponding to an electrostatic capacity between said developing member and said developer path electrode is generated when a voltage is applied to said developing member from the main assembly of said electrophotographic image forming apparatus, to permit detection of a remaining amount of the developer by measuring the electric signal.

34. (Amended) A process cartridge detachably mountable to a main assembly of an electrophotographic image forming apparatus, comprising:

- (a) an electrophotographic photosensitive member; and
- (b) a developing device including:

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode provided so as to exhibit the same [or] potential as said developing member;

a second electrode disposed such that at least a lower end thereof takes a position lower than said first electrode when said developing device is mounted to the main assembly of the electrophotographic image forming apparatus;

a developer path electrode disposed along a path along which the developer accommodated in said developer accommodating portion moves to said developing member;

a first electrical contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said first electrode when said process cartridge is mounted to the main assembly of said electrophotographic image forming apparatus;

a second electric contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said developing member when said process cartridge is mounted to the main assembly of said electrophotographic image forming apparatus; and

a third electrical contact for transmitting, to the main assembly of the electrophotographic image forming apparatus, an electric signal corresponding to electrostatic capacities at least between said first electrode and said second electrode and between said developing member and said developer path electrode to detect a remaining



amount of the developer by the main assembly of the electrophotographic image forming apparatus.

35. (Unamended) A process cartridge according to Claim 33 or 34, wherein said developer path electrode is in the form of a plate extending along the path.

36. (Unamended) A process cartridge according to Claim 34, further comprising a third electrode provided between said second electrode said second electrode and said developing member.

37. (Amended) A process cartridge according to Claim 36, [wherein] wherein said third electrode is a member which is integral with or separate from said second electrode, and is disposed opposed to said developing member .

38. (Amended) A process cartridge according to any one of Claims [33-37] 33, 34, 36, and 37, wherein said first electrode and said second electrode are arranged along a length of said developing member which is in the form of a developing roller.

39. (Amended) A process cartridge according to any one of Claims [33-38] 33, 34, 36, and 37, wherein said first electrode and a frame supporting said second electrode constitute a recess extending parallel to said developing member, and said recess [opens] opening downward.

40. (Amended) A process cartridge according to any one of Claims [33-39] 33, 34, 36, and 37, further comprising [and] an intermediary electrode between said developing member and said developer path electrode.

41. (Amended) A process cartridge according to any one of Claims [34-40] 34, 36, and 37, further comprising developer stirring means for stirring the developer, wherein at least said first and second electrodes are disposed in a moving range of the developer provided by rotation of said developer stirring means.

42. (Unamended) A process cartridge according to any one of Claims 22, 27 or 34, further comprising further comprising a stirring member for stirring the developer accommodated therein, wherein at least a lower end of said second electrode takes a position lower than said first electrode in a direction of movement of the developer provided by said stirring member, when said developing device is mounted to the main assembly of the electrophotographic image forming apparatus.

43. (Amended) An electrophotographic image forming apparatus for forming an image on a recording material, comprising:

- (a) an electrophotographic photosensitive member; [and]
- (b) an electrostatic latent image forming means for forming an electrostatic latent image on said electrophotographic photosensitive member; and
- (c) a developing device for developing an electrostatic latent image formed on said electrophotographic photosensitive member, said developing device including:

a developing member for supplying the developer to said electrophotographic photosensitive member;

a first electrode disposed opposed to said developing member; a second electrode disposed such that at least a lower end thereof takes a position lower than said first electrode when said developing device is mounted to a main assembly of the electrophotographic image forming apparatus;

wherein an electric signal is generated in accordance with an electrostatic capacity between said first electrode and second electrode when said first electrode or second electrode is supplied with a voltage from the main assembly of said electrophotographic image forming apparatus, and is measured by the main assembly of the electrophotographic image forming apparatus to detect a remaining amount of the developer.

44. (Amended) An electrophotographic image forming apparatus for forming an image on a recording material, wherein a process cartridge is detachably mountable to said electrophotographic image forming apparatus, said electrophotographic image forming apparatus comprising:

(a) an electrophotographic photosensitive member; [and]

(b) mounting means for mounting the process cartridge, said process cartridge including:

a developing member for supplying a developer to said electrophotographic photosensitive member to develop an electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode disposed opposed to said developing member; and

a second electrode disposed such that at least a lower end thereof takes a position lower than said first electrode when said developing device is mounted to the main assembly of the electrophotographic image forming apparatus; [and said apparatus further comprising:]

[(b)] (c) electrostatic latent image forming means for forming the electrostatic latent image on said electrophotographic photosensitive member; and

(d) developer remaining amount detecting means for detecting a remaining amount of the developer by measuring an electric signal which is produced by application of a voltage to said first electrode or second electrode and which corresponds to an electrostatic capacity between said first electrode and second electrode.

45. (Unamended) An apparatus according to Claim 43 or 44, wherein said first electrode and said second electrode are disposed along a length of said developing member which is in the form of a developing roller.

46. (Amended) A apparatus according to Claim 43[,] or 44 [or 45], wherein said first electrode and a frame supporting said second electrode constitute a recess extending parallel to said developing device frame, said recess [opens] opening downward.

47. (Amended) An apparatus according to any one of Claims [43-46] 43 and 44, wherein each of said first electrode and second electrode has a plate shape, wherein a

length of said first electrode, measured in a direction crossing with a longitudinal direction of said developing member, is longer than said second electrode.

48. (Amended) An apparatus according to Claim 43[,] or 44 [or 45], wherein one and the other of said first and second electrodes are plate-like and rod-like electrodes.

49. (Amended) An electrophotographic image forming apparatus for forming an image on a recording material, comprising

(a) an electrophotographic photosensitive member[.];

(b) an electrostatic latent image forming means for forming an electrostatic latent image on said electrophotographic photosensitive member;

(c) a developing device for developing the electrostatic latent image formed on said electrophotographic photosensitive member, said developing device including[.];

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode disposed opposed to said developing member;

a second electrode disposed such that at least a lower end thereof takes a position lower than said first electrode when said developing device is mounted to the main assembly of the electrophotographic image forming apparatus;

a third electrode disposed between said second electrode and said developing member;

a first electrical contact for receiving, from the main assembly of said electrophotographic

image forming apparatus, a voltage to be applied to said first electrode when said developing device is mounted to the main assembly of said electrophotographic image forming apparatus;

a second electrical contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said developing member when said developing device is mounted to the main assembly of said electrophotographic image forming apparatus;

a third electrical contact for transmitting, to the main assembly of said electrophotographic image forming apparatus, an electric signal corresponding at least to electrostatic capacities between said first electrode and second electrode and between said developing member and said third electrode, when the voltages are applied to said first electrode and to said developing member; and

(d) developer amount detecting means for detecting an amount of the developer in said developing device on the basis of the electric signal transmitted from said third electric contact.

50. (Amended) An electrophotographic image forming apparatus for forming an image on a recording material, wherein a process cartridge is detachably mountable to a main assembly of said electrophotographic image forming apparatus, said electrophotographic image forming apparatus comprising:

(a) an electrophotographic photosensitive member;

(b) mounting means for detachably mounting the process cartridge, the process cartridge including[;];

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode disposed opposed to said developing member;

a second electrode disposed such that at least a lower end thereof takes a position lower than said first electrode when said developing device is mounted to the main assembly of the electrophotographic image forming apparatus;

a third electrode disposed between said second electrode and said developing member;

a first electrical contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said first electrode when said developing device is mounted to the main assembly of said electrophotographic image forming apparatus;

a second electrical contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said developing member when said developing device is mounted to the main assembly of said electrophotographic image forming apparatus; and

a third electrical contact for transmitting, to the main assembly of said electrophotographic image forming apparatus, an electric signal corresponding at least to electrostatic capacities between said first electrode and second electrode and between said developing member and said third electrode, when the voltages are applied to said first electrode and to said developing member, to detect a remaining amount of the developer by the main assembly of the electrophotographic image forming apparatus;

(c) electrostatic latent image forming means for forming the electrostatic latent image on said electrophotographic photosensitive member; and

(d) developer amount detecting means for detecting an amount of the developer in said developing device on the basis of the electric signal transmitted from said third electric contact.

51. (Unamended) An apparatus according to Claim 49 or 50, wherein said first electrode and said second electrode are disposed along a length of said developing member which is in the form of a developing roller.

52. (Amended) An apparatus according to Claim 49[,] or 50 [or 51], wherein said first electrode and a frame supporting said second electrode constitute a recess extending parallel to said developing member, and said recess [opens] opening downward.

53. (Amended) An apparatus according to Claim 49[,] or 50 [, 51 or 52], wherein said third electrode is a member which is integral with or separate from said second electrode, and is disposed opposed to said developing member.

54. (Amended) An apparatus according to any one of Claims [49-53] 49 and 50, further comprising a developer chamber having an opening in which said developing member is supported, and a developer container, connected with said developer chamber, for accommodating the developer, wherein said first, second and third electrodes are provided in said developer chamber.



55. (Amended) An apparatus according to any one of Claims [43-54] 43, 44, 49, and 50, further comprising developer stirring means for stirring the developer, wherein at least said first and second electrodes are disposed in a moving range of the developer provided by rotation of said developer stirring means.

56. (Amended) An electrophotographic image forming apparatus for forming an image on a recording material, comprising

(a) an electrophotographic photosensitive member,

(b) an electrostatic latent image forming means for forming an electrostatic latent image on said electrophotographic photosensitive member;

(c) a developing device for developing the electrostatic latent image formed on said electrophotographic photosensitive member, said developing device including[;]:

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a developer accommodating portion for accommodating the developer to be used for development of the electrostatic latent image by said developing member; and

a developer path electrode disposed along a path along which the developer accommodated in said developer accommodating portion moves to said developing member;

wherein an electric signal corresponding to an electrostatic capacity between said developing member and said developer path electrode is generated when a voltage is applied to said developing member from the main assembly of said electrophotographic

image forming apparatus, to permit detection of a remaining amount of the developer by measuring the electric signal.

57. (Amended) An electrophotographic image forming apparatus for forming an image on a recording material, comprising:

(a) an electrophotographic photosensitive member[.];

(b) an electrostatic latent image forming means for forming an electrostatic latent image on said electrophotographic photosensitive member;

(c) a developing device for developing the electrostatic latent image formed on said electrophotographic photosensitive member, said developing device including[.];

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode provided so as to exhibit the same [or] potential as said developing member;

a second electrode disposed such that at least a lower end thereof takes a position lower than said first electrode when said developing device is mounted to the main assembly of the electrophotographic image forming apparatus;

a developer path electrode disposed along a path along which the developer accommodated in said developer accommodating portion moves to said developing member;

a first electrical contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said first electrode

when said developing device is mounted to the main assembly of said electrophotographic image forming apparatus;

a second electric contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said developing member when said developing device is mounted to the main assembly of said electrophotographic image forming apparatus; and

a third electrical contact for transmitting, to the main assembly of the electrophotographic image forming apparatus, an electric signal corresponding to electrostatic capacities at least between said first electrode and said second electrode and between said developing member and said developer path electrode to detect a remaining amount of the developer by the main assembly of the electrophotographic image forming apparatus.

58. (Amended) An electrophotographic image forming apparatus for forming an image on a recording material, wherein a process cartridge is detachably mountable to a main assembly of said electrophotographic image forming apparatus, said electrophotographic image forming apparatus comprising:

(a) an electrophotographic photosensitive member;

(b) mounting means for detachably mounting the process cartridge, the process cartridge including[;];

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a developer accommodating portion for accommodating the developer to be used for development of the electrostatic latent image by said developing member; and

a developer path electrode disposed along a path along which the developer accommodated in said developer accommodating portion moves to said developing member;

wherein an electric signal corresponding to an electrostatic capacity between said developing member and said developer path electrode is generated when a voltage is applied to said developing member from the main assembly of said electrophotographic image forming apparatus, to permit detection of a remaining amount of the developer by measuring the electric signal.

59. (Amended) An electrophotographic image forming apparatus for forming an image on a recording material, wherein a process cartridge is detachably mountable to a main assembly of said electrophotographic image forming apparatus, said electrophotographic image forming apparatus comprising:

(a) an electrophotographic photosensitive member;

(b) mounting means for detachably mounting the process cartridge, the process cartridge including[;]:

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode provided so as to exhibit the same [or] potential as said developing member;

a second electrode disposed such that at least a lower end thereof takes a position lower than said first electrode when said developing device is mounted to the main assembly of the electrophotographic image forming apparatus;

a developer path electrode disposed along a path along which the developer accommodated in said developer accommodating portion moves to said developing member;

a first electrical contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said first electrode when said developing device is mounted to the main assembly of said electrophotographic image forming apparatus;

a second electric contact for receiving, from the main assembly of said electrophotographic image forming apparatus, a voltage to be applied to said developing member when said developing device is mounted to the main assembly of said electrophotographic image forming apparatus; and

a third electrical contact for transmitting, to the main assembly of the electrophotographic image forming apparatus, an electric signal corresponding to electrostatic capacities at least between said first electrode and said second electrode and between said developing member and said developer path electrode to detect a remaining amount of the developer by the main assembly of the electrophotographic image forming apparatus;

(b) electrostatic latent image forming means for forming the electrostatic latent image on said electrophotographic photosensitive member; and

(c) developer amount detecting means for detecting an amount of the developer in said developing device on the basis of the electric signal transmitted from said third electric contact.

60. (Unamended) An apparatus according to any one of Claims 56-59, wherein said developer path electrode is in the form of a plate extending along the path.

61. (Amended) An apparatus according to any one of Claims [56-60] 56-59, further comprising a third electrode provided between said second electrode said second electrode and said developing member.

62. (Unamended) An apparatus according to according to Claim 61, wherein said third electrode is a member which is integral with or separate from said second electrode, and is disposed opposed to said developing member.

63. (Amended) An apparatus according to any one of Claims [56-62] 56-59, wherein said first electrode and said second electrode are arranged along a length of said developing member which is in the form of a developing roller.

64. (Amended) An apparatus according to any one of Claims [56-63] 56-59, wherein said first electrode and a frame supporting said second electrode constitute a recess extending parallel to said developing member, and said recess [opens] opening downward.

65. (Amended) An apparatus according to any one of Claims [56-64] 56-59, further comprising [and] an intermediary electrode between said developing member and said developer path electrode.

66. (Amended) An apparatus according to any one of Claims [56-65] 56-59, further comprising developer stirring means for stirring the developer, wherein at least said first electrode and second electrode are disposed in a moving range of the developer provided by rotation of said developer stirring means.

67. (Unamended) A developing device for developing an electrostatic latent image formed on an electrophotographic photosensitive member, said developing device being usable with an electrophotographic image forming apparatus, said developing device comprising:

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode disposed opposed to said developing member;

a stirring member for stirring the developer accommodated;

a second electrode which is disposed at a position different from that of said first electrode in a direction crossing with a moving direction of the developer provided by said stirring member;

wherein an electric signal is generated in accordance with an electrostatic capacity between said first electrode and second electrode when said first electrode or second

electrode is supplied with a voltage from the main assembly of said electrophotographic image forming apparatus, and is measured by the main assembly of the electrophotographic image forming apparatus to detect a remaining amount of the developer.

68. (Unamended) A device according to Claim 67, wherein said first electrode and said second electrode are disposed along a length of said developing member which is in the form of a developing roller.

69. (Amended) A device according to Claim 67 or 68, wherein said first electrode and a frame supporting said second electrode constitute a recess extending parallel to said developing device frame, said recess [opens] opening downward.

70. (Amended) A device according to Claim 67[, or 68 [or 69], wherein each of said first electrode and second electrode has a plate shape, wherein a length of said first electrode, measured in a direction crossing with a longitudinal direction of said developing member, is longer than said second electrode.

71. (Unamended) A device according to Claim 67 or 68, wherein one and the other of said first and second electrodes are plate-like and rod-like electrodes.

72. (Unamended) A process cartridge detachably mountable to a main assembly of an electrophotographic image forming apparatus, comprising:



(a) an electrophotographic photosensitive member; and

(b) a developing device including:

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode disposed opposed to said developing member;

a stirring member for stirring the developer accommodated;

a second electrode which is disposed at a position different from that of said first electrode in a direction crossing with a moving direction of the developer provided by said stirring member;

wherein an electric signal is generated in accordance with an electrostatic capacity between said first electrode and second electrode when said first electrode or second electrode is supplied with a voltage from the main assembly of said electrophotographic image forming apparatus, and is measured by the main assembly of the electrophotographic image forming apparatus to detect a remaining amount of the developer.

73. (Unamended) A process cartridge according to Claim 72, wherein said first electrode and said second electrode are disposed along a length of said developing member which is in the form of a developing roller.

74. (Amended) A process cartridge according to Claim 72 or 73, wherein said first electrode and a frame supporting said second electrode constitute a recess extending parallel to said developing device frame, said recess [opens] opening downward.

75. (Amended) A process cartridge according to Claim 72[, or 73 [or 74], wherein each of said first electrode and second electrode has a plate shape, wherein a length of said first electrode, measured in a direction crossing with a longitudinal direction of said developing member, is longer than said second electrode.

76. (Unamended) A process cartridge according to Claim 72 or 73, wherein one and the other of said first and second electrodes are plate-like and rod-like electrodes.

77. (Amended) An electrophotographic image forming apparatus for forming an image on a recording material, comprising:

(a) an electrophotographic photosensitive member[.];

(b) an electrostatic latent image forming means for forming an electrostatic latent image on said electrophotographic photosensitive member;

(c) a developing device for developing the electrostatic latent image formed on said electrophotographic photosensitive member, said developing device including[.];

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode disposed opposed to said developing member;

a stirring member for stirring the developer accommodated;

a second electrode which is disposed at a position different from that of said first electrode in a direction crossing with a moving direction of the developer provided by said stirring member;

wherein an electric signal is generated in accordance with an electrostatic capacity between said first electrode and second electrode when said first electrode or second electrode is supplied with a voltage from the main assembly of said electrophotographic image forming apparatus, and is measured by the main assembly of the electrophotographic image forming apparatus to detect a remaining amount of the developer.

78. (Amended) An electrophotographic image forming apparatus for forming an image on a recording material, wherein a process cartridge is detachably mountable to a main assembly of said electrophotographic image forming apparatus, said electrophotographic image forming apparatus comprising:

(a) an electrophotographic photosensitive member;

(b) mounting means for detachably mounting the process cartridge, the process cartridge including[;]:

a developing member for supplying a developer to said electrophotographic photosensitive member to develop the electrostatic latent image formed on said electrophotographic photosensitive member;

a first electrode disposed opposed to said developing member;

a stirring member for stirring the developer accommodated;

a second electrode which is disposed at a position different from that of said first electrode in a direction crossing with a moving direction of the developer provided by said stirring member;

(c) electrostatic latent image forming means for forming the electrostatic latent image on said electrophotographic photosensitive member; and

(d) developer amount detecting means for detecting an amount of the developer in said developing device on the basis of the electric signal transmitted from said third electric contact.

79. (Unamended) An apparatus according to Claim 77 or 78, wherein said first electrode and said second electrode are disposed along a length of said developing member which is in the form of a developing roller.

80. (Amended) An apparatus according to Claim 77[,] or 78 [or 79], wherein said first electrode and a frame supporting said second electrode constitute a recess extending parallel to said developing device frame, said recess [opens] opening downward.

81. (Amended) An apparatus according to Claim [77-80] 77 and 78, wherein each of said first electrode and second electrode has a plate shape, wherein a length of said first electrode, measured in a direction crossing with a longitudinal direction of said developing member, is longer than said second electrode.

82. (Amended) An apparatus according to Claim 77[, or 78 [or 79], wherein one and the other of said first and second electrodes are plate-like and rod-like electrodes.